UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,611	06/27/2001	Mamoru Nakasuji	010817	8874

38834 7590 09/29/2004

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER	
BERMAN, JACK I	
ART UNIT	**PAPER NUMBER**
2881	

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/891,611	NAKASUJI ET AL.	
	Examiner	**Art Unit**	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *105-108 and 110-149* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *105-108 and 110-149* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 136, 138, and 140 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The amendments to these claims have done nothing to clarify them. All three of these claims now claim that "the secondary optical system in the first row and the secondary optical system in the second row are disposed in the opposite direction with each other." How is applicant defining the direction of the secondary optical systems so that the secondary optical system in one row is disposed in the opposite direction of the secondary optical system in the other row? Where is support for this in the original disclosure? There is still no explanation as to how disposing the primary and secondary optical systems in two rows and in plural columns prevents a path of secondary charged particles deflected by one of the E x B separators from interfering with a path of the secondary charged particles deflected by the other E x B separator, as is claimed in claim 136, or how disposing the primary and secondary optical systems in two rows and in plural columns prevents paths of secondary charged particles deflected by the E x B separator from interfering with each other as is claimed in claim 138. In fact, claim 136 conflicts with its parent claim 124 because claim 136 requires two E x B separators ("one of the E x B separators" and "the other E x B separator") and claim 124 requires a single E x B separator ("an E x B separator which [is] common to the primary charged particle beam irradiation systems and the secondary charged

particle optical systems"). As was explained in the previous Office actions, the disclosure was so unclear that no comparison with the prior art could be made.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 115 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant is correct in saying that the claim does not include the phrase "of irradiation" as originally included in claim 11; however, as was explained in the previous Office action, it is the meaning of the entire limitation "the primary optical system has a function of scanning the charged particle beams at a distance greater than the interval of irradiation of the neighboring charged particle beams" that is unclear. The omission of the words "of irradiation" does nothing to answer the question: What is meant by "the primary optical system has a function of scanning the charged particles at a distance greater than the interval of the neighboring charged particle beams"? Is applicant trying to claim that the primary optical system scans the charged particle beams *over* a distance greater than the interval of the neighboring charged particle beams, that the primary optical system is located at a distance from the sample that is greater than the interval of the neighboring charged particle beams, or is some other meaning intended? The language of this limitation is so garbled that it is not clear what subject matter applicant was intending to claim. Therefore, the invention claimed could not be compared to the prior art. The lack of a rejection based upon prior art should not be construed as a determination that the claims contain allowable subject matter, only that the claim is incomprehensible.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 114, 135, and 141 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,892,224 to Nakasuji for the reasons explained in the previous Office action.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of U.S. Patent No. 4,954,705 to Brunner et al. As was explained in the previous Office action, Nakasuji discloses an inspection apparatus for inspecting an object of inspection by irradiating the object of inspection with charged particles comprising:

a working chamber controllable into a vacuum atmosphere for inspecting an object of inspection (not labeled but inherently required because electron beam optical systems only work in a vacuum);

a beam source (1) for generating the charged particles or the electromagnetic wave as a plurality of beams (EB11, EB21, EB31, ..., EB36);

a primary electronic optical system for irradiating the plurality of beams to the object of inspection held in the working chamber, and a secondary electronic optical system for converging secondary charged particles generated from the object and leading to an image processing system (signal processor 12) which forms an image based on the secondary charged particles;

a data processing system (memory 14) for displaying and/or memorizing a state information of the object based on output of the image processing system; and

a stage system (28) for holding the object so as to be movable relative to the beam,

wherein an electric field for accelerating the charged particle beams is applied between a first stage lens of the secondary optical system and a surface of the object (lines 13-19 in column 9), and the secondary charged particles emitted from the surface of the object at an angle relative to a normal line of the surface of the object pass through the secondary optical system. While Nakasuji does not specifically teach to use secondary charged particles emitted at an angle of 45 degrees relative to the normal, the patent does teach at lines 23-41 in column 10 that the angle should be oblique and large enough to allow more space for detectors than is permitted by the space permitted when the primary beam irradiates the sample from a normal. Since angles of at least 45 degrees meet this criterion, such angles would be at least obvious over, if not inherently anticipated by, Nakasuji. While Nakasuji irradiates the sample with the primary beams at an oblique angle so as to provide separation between the primary beams and the secondary electrons emitted so that there is more room for detectors, Brunner et al. discloses an inspection apparatus wherein the electronic optical system comprises an objective lens (L2) and an E x B separator (WF), forms a plurality of beams to irradiate the object (see lines 14-22 and 37-48 in column 3), and includes an optical system for accelerating secondary charged particles emitted by irradiation of the beams through the objective lens (see lines 48-51 in column 2), separating the particles by the E x B separator (see Figure 2), and projecting an image of secondary charged particles (see lines 51-62 in column 2), and a plurality of detectors for detecting the image of secondary charged particles (see lines 62-66 in column 2). (The Brunner et al device is also described in Section 3 of the article "Multi-Beam Concepts for Nanometer Devices" by Lischke et al., cited in the Information Disclosure Statement filed on January 18, 2002.) It would have been obvious to

a person having ordinary skill in the art to use the electron-optical system disclosed by Brunner et al. to control the multiple electron beams used by Nakasuji when the Nakasuji apparatus is used to inspect semiconductors for defects since the Brunner et al. electron-optical system is designed specifically for this purpose. Since both Nakasuji and Brunner et al. teach that the plurality of charged particle beams may be formed by either providing a plurality of electron beam sources or an aperture plate that divides a single electron beam into a plurality of electron beams, the provision of both a plurality of electron sources and aperture plates that divide the electron beams from each of these electron sources into a larger plurality of beams would have been an obvious duplication of parts, as would the provision of a plurality of E x B separators as claimed in Claim 140 of the instant application. While Brunner et al. uses the same lenses for both the primary electrons and the secondary electrons, the patent explicitly teaches at lines 56-64 in column 3:

> "Further lenses can be provided in the described electron beam measuring instrument in order to achieve the necessary demagnification of the primary electron source or, respectively, magnification of the secondary particle source.
>
> Of course, it is also possible to separate the electron-optical beam paths of primary particles and secondary particles and to provide imaging elements for each beam path."

Nakasuji further teaches, at lines 13-62 in column 11, that when the plurality of electron beams are formed by means of an aperture plate between the electron source and the sample, the position of the single aperture plate in the direction of the optical axis should be disposed so as to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample. At lines 41 in column 12 through line 41 in column 13, Nakasuji also teaches to provide a second multi-aperture plate with a plurality of apertures disposed in front of

the detector wherein the positions of the apertures formed in the second multi-aperture plate are arranged so as to correct a distortion in the secondary optical system.

Claims 106-108 and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of U.S. Patent No. 6,344,750 to Lo et al. As was explained in the previous Office action, Nakasuji does not teach how the object under test is moved in or out of the (inherently required) working chamber, to isolate the object under test from vibrations, to apply a voltage to the object under test, how the object under test is held, or how the positioning of the object under test is determined. Lo et al. discloses scanning electron beam inspection apparatus similar to Nakasuji's and teaches at lines 53-60 in column 7 that transport mechanisms for securing an object under testing for transportation into and out of a testing chamber are conventional. It would have been obvious to a person having ordinary skill in the art to provide the Nakasuji/ Brunner et al. apparatus discussed above with the conventional transport mechanism cited by Lo et al. At lines 48-53 in column 7, Lo et al. teaches to provide a vibration isolator (50) for preventing vibrations of the object under testing. It would have been obvious to a person having ordinary skill in the art to provide such a device in the Nakasuji/ Brunner et al. apparatus discussed above because vibrations would be as detrimental to image resolution in the Nakasuji/Brunner et al. apparatus as they would be in the Lo et al. apparatus. At lines 4-20 in column 7 Lo et al. teaches to apply a voltage to the object (22) from a bias source (28) and to increase or decrease this voltage from zero to a predetermined value in order to either optimize voltage contrast or control the landing energy of the primary beam to prevent charge leakage through layers on the object under inspection. It would have been obvious to a person

having ordinary skill in the art to apply this voltage to the sample in the Nakasuji/ Brunner et al. system discussed above in order to have the same degree of control as in the Lo et al. apparatus. Lo et al. also teaches, at lines 38-44 in column 7 and lines 38-40 in column 8, that an alignment controller to control the position of the sample is needed and may comprise a laser interference type distance measuring unit (laser interferometer) for observing the surface of the object of inspection and providing feedback to determine the coordinates of the stage. It would have been obvious to a person having ordinary skill in the art to provide such an alignment controller including a laser interferometer as the controller in the Nakasuji/ Brunner et al. apparatus discussed above that Lo et al. teaches is required.

Claims 110 and 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji, Brunner et al., and Lo et al. as applied to claims 106-108 and 111 above, and further in view of U.S. Patent No. 4,911,103 to Davis et al. While Lo et al. teaches a person having ordinary skill in the art to provide the Nakasuji apparatus with a conventional transport mechanism, including a loading chamber (loadlock subsystem 52), and to provide a vibration isolator (50) for preventing vibrations of the object under testing, neither Nakasuji, Brunner et al., nor Lo et al. discuss the problem of dust adhering to a wafer as the loading chamber is evacuated. Davis et al. discusses this problem at line 64 in column 10 through line 31 in column 11 and teaches that it occurs whenever wafers are transferred into a vacuum chamber through a loading chamber and further teaches to solve it by supplying a clean gas to the wafer. It would have been obvious to a person having ordinary skill in the art to apply Davis et al.'s solution to this problem, which would inherently occur in the Nakasuji/Brunner et al./Lo et al. apparatus discussed above, by using Lo et al.'s loadlock subsystem as a mini-environment chamber for

supplying a clean gas to said object under testing to prevent dust from attaching to said object under testing. Davis et al. also teaches, at lines 20-27 in column 23, that any number of load lock chambers and processing modules and transfer arms can be provided to deliver wafers between any two chambers in any sequence if desired. The provision of a plurality of loading chambers disposed between the mini-environment chamber discussed above and the testing chamber, each adapted to be independently controllable in a vacuum atmosphere, a first transport unit for transporting an object under testing between one of the loading chambers and the mini-environment chamber, and a second transport unit for transporting said object under testing between one of said loading chambers and said testing chamber would therefore have been an obvious duplication of parts in accordance with Davis et al.'s suggestion. Davis et al. also teaches, at lines 42-61 in column 13, to perform a rough alignment of the object of inspection in the XY-directions and in the direction of rotation within the mini-environment space and it would have been obvious to a person having ordinary skill in the art to also include this function in the Nakasuji/Brunner et al./Lo et al. apparatus discussed above for the same reasons discussed by Davis et al., i.e. quicker throughput.

Claims 114, 120-123, and 142 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,430,292 to Honjo et al. Honjo et al. discloses an inspection apparatus (2) for inspecting an object of inspection by irradiating the object of inspection with charged particles comprising: a working chamber controllable into a vacuum atmosphere for inspecting an object of inspection (not labeled but inherently required because electron beam optical systems only work in a vacuum); a beam generating means (21, 101, 311) for emitting the charged particles as a beam; a primary electronic optical system (25) wherein a plurality of beams (B) is guided to

irradiate the object (S) of inspection held in the working chamber, and a secondary optical system (630, 631 in Fig. 37) leads secondary charged particles generated from the object to at least one detector (632) where they are detected and the detector output signals are led to an image processing system (355) which forms an image based on the secondary charged particles; a data processing system (356) for displaying and/or memorizing a state information of the object based on output of the image processing system; and a stage system (3)for holding the object so as to be movable relative to the beam. Honjo et al. also teaches throughout the patent that the apparatus is useful for detecting defects on wafers during or after a manufacturing process. At lines 52-65 in column 27, Honjo et al. describes how the plurality of the charged particle beams are irradiated at positions separated by distance resolution of the secondary optical system. At lines 53-58 in column 9, Honjo et al. teaches that inspection, including the detection of secondary charged particles, occurs while transferring the sample. At lines 29-32 in the same column, Honjo et al. teaches that the points of irradiation by the primary charged beams to be formed on the surface of the sample may be arranged in two dimensional directions, i.e. in rows and columns. At line 63 in column 9 through line 21 in column 10, Honjo et al. teaches that the plurality of charged particle beams can be formed by directing a primary beam (B) through an aperture plate having a plurality of apertures adapted to form a plurality of charged particle beams, the beams being formed by containing particles generated by the beam generating means to form irradiation points disposed in rows N in a direction of transferring the sample and in columns M in a direction perpendicular to the direction of transferring the sample, and the apertures are located within a range of a predetermined electron density of the charged particles emitted from the beam generating means. The new limitation added to claim 120, that the

primary charged particles are disposed nearby the optical axis, is too vague to patentably distinguish the invention. How close is "nearby"?

Claim 126 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji and Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of Honjo et al. At line 21 in column 9 through line 9 in column 10, Honjo et al. teaches that the use of a primary optical system having a beam source with an integrated cathode with multiple emission areas for irradiating output beams to an aperture plate with a plurality of apertures and for focusing and irradiating beams passed through the plurality of apertures on a sample surface is equivalent to irradiating a beam emitted from a beam source to an aperture plate having a plurality of apertures to produce images of the plurality of the apertures and delivering the plurality of the images to the sample. The use of a beam source with an integrated cathode with multiple emission areas instead of the single beam source and aperture plate having a plurality of apertures used in the Nakasuji/Brunner et al. discussed above would therefore have been a substitution of known equivalents.

Claims 137, 139, and 148 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji and Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of U.S. Patent No. 6,614,026 to Adamec. Brunner et al. does not specify where the beam scanning means is in relation to the E x B separator (Wien filter), but Adamec teaches, at lines 1-4 in column 8, that such an E x B separator may be located within a deflector of the kind used for scanning so that the deflection field is superimposed upon the crossed electric and magnetic fields. Although the illustrations in the Adamec patent appear to suggest magnetic deflectors, no such limitation appears in the specification and since, as the

disclosure discusses, both electric fields and magnetic fields cause deflection of electron beams passing through them, it would have been obvious to a person having ordinary skill in the art that an additional electric field could be superimposed on the crossed electric and magnetic fields as easily as a magnetic field for scanning purposes. The use of such superimposed fields to perform the scanning and separating functions required in the Nakasuji/Brunner et al. apparatus discussed above would have been an obvious substitution of equivalent parts.

Claims 133 and 149 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji and Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of U.S. Patent No. 6,509,569 to Frosien. At lines 39-49 in column 1, Frosien teaches that it is known in the art to focus the images of secondary charged particles onto a deflecting main plane of an E x B separator used to separate primary electrons from secondary electrons. At lines 4-10 and 60-63 in column 3, Frosien teaches that when an E x B separator is used to separate a beam of primary electrons from a beam of secondary electrons traveling in the opposite direction, the E x B separator can deflect only one of the beams achromatically (without chromatic aberration), so in order to compensate for chromatic aberrations in the other beam, that beam should be focused so that its crossover, that is to say the image of the source of the beam as seen from the point of view of the separator, is positioned on the separator. It would have been obvious to a person having ordinary skill in the art to the Nakasuji/Brunner et al. apparatus discussed above in order to eliminate chromatic aberrations. This would require positioning either the secondary electron image of the surface or the image of the plurality of apertures used by Nakasuji to form the plurality of beams at the position of the E x B separator.

Applicant's arguments filed August 18, 2004 have been fully considered but they are not persuasive.

With regards to claim 114, applicant argues that Nakasuji does not teach to irradiate the charged particle beams at positions that are "separated larger than a distance resolution of the secondary optical systems." As the examiner explained in the previous Office action, Nakasuji teaches, at lines 36-41 in column 9, that the positions at which the plurality of the charged particles are irradiated are separated enough that the secondary charged particles generated by each beam will only be incident on the detector designated for that beam, i.e. the separation of these positions is larger than a distance resolution of the secondary optical system. Applicant acknowledges this statement, but then asserts that this does not anticipate this feature of claim 114. Since applicant does not support this assertion with either evidence or a line of reasoning, it is does not constitute a persuasive argument.

With regards to claim 132, applicant has amended it to depend from claim 131, which claims that the beams are formed in N rows and M columns in a two dimensional way on an optical axis. As was explained in the previous Office action, Nakasuji illustrates exactly this arrangement in Figures 2(b) and 7. Applicant then states: "It is respectfully submitted that Nakasuji fails to teach or suggest such features as set forth in claims 132 and 135." Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

With regards to the rejection of claims 114, 120-123, and 142 as being anticipated by Honjo et al., applicant argues that, as with Nakasuji, Honjo et al. does not teach to irradiate the

charged particle beams at positions that are "separated larger than a distance resolution of the secondary optical systems." As the examiner explained in the previous Office action, Honjo et al. describes, at lines 52-65 in column 27, how the plurality of the charged particle beams are irradiated at positions separated by distance resolution of the secondary optical system. The arguments filed on August 18 say nothing to refute this statement.

With regards to the rejection of claims 109 (now incorporated into claim 105), 116-119, 124, 125, 127-131, 134, and 143-147 applicant argues that Brunner et al. does not teach the feature "wherein secondary charged particles are separated from the primary charged particle beams after they pass through the objective lens before they enter to the next lens". Fig. 2 of Brunner et al. illustrates that the secondary charged particles may be separated from the primary charged particles after they pass through the objective lens L2. As was explained in the previous Office action, Brunner et al. explicitly teaches at lines 56-64 in column 3:

> "Further lenses can be provided in the described electron beam measuring instrument in order to achieve the necessary demagnification of the primary electron source or, respectively, magnification of the secondary particle source.
>
> Of course, it is also possible to separate the electron-optical beam paths of primary particles and secondary particles and to provide imaging elements for each beam path."

It would therefore have been obvious to a person having ordinary skill in the art to provide an additional stage lens through which the secondary charged particles pass after they are separated by the E x B separator in order to magnify the secondary particle source in the manner taught by Brunner et al. Applicant also asserts that the feature "a primary optical system having a beam source with an integrated cathode with multiple emission areas" is not taught by Nakasuji or Brunner et al.

With regards to the rejection of claims 127, 128, and 130, applicant argues that neither Nakasuji nor Brunner et al. teach the features "the position of the single aperture plate in the direction of the optical axis thereof is disposed so as to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample" or "wherein an amount of deviation is set so that a difference between an amount of detection of the secondary charged particles obtained for the plurality of the apertures is minimized when a sample with no pattern is disposed on a surface of the sample" or "the positions of the plurality of the apertures are disposed so as to correct a distortion of the primary optical system". Applicant is mistaken. As was stated in the previous Office action, Nakasuji further teaches, at lines 13-62 in column 11, that when the plurality of electron beams are formed by means of an aperture plate between the electron source and the sample, the position of the single aperture plate in the direction of the optical axis should be disposed so as to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample. This step of making the primary beams uniform inherently minimizes the difference between the amounts of secondary charged particles obtained for the plurality of apertures when a sample with no pattern on the surface is provided because identical primary beams striking identical points on a surface (on an unpatterned surface, all points on the surface are by definition identical) will produce identical amounts of secondary electrons. This physical phenomenon is the basis for the widespread use of a scanning electron microscope as an observational and analytical tool.

With regards to the rejection of claim 131, applicant argues: "the art discloses beams disposed in rows N and in columns M. However, the rows N and columns M are not on one optical axis, and include optical axes disposed in rows N and in columns M wherein there is only

one beam on one optical axis." This argument is not convincing because the claim does not state that all N x M beams are on the same axis, only that the primary optical system that produces the N x M beams has an optical axis. The distinction is critical because if all of the beams were on the same optical axis, they would, by definition, strike the same point on the sample, defeating the purpose of the invention to inspect a plurality of points on a sample simultaneously. As can be seen in Fig. 1 of the Nakasuji patent, Nakasuji also has a single optical axis AX for the primary optical system.

With regard to the rejection of claim 137, applicant's argument that this claim requires an electric field to scan electron beams while the prior art suggests either electric or magnetic fields may be used is not persuasive because there is no evidence that Adamec requires magnetic fields for scanning and prohibits the use of electric fields for this purpose. If, as is explained above, Adamec suggests to a person having ordinary skill in the art to superimpose either a magnetic or an electric scanning field onto the crossed electric and magnetic fields of an E x B separator of the type used by Brunner et al, then the choice of either one of these two options for the scanning field cannot patentably distinguish over the prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jack I. Berman

Jack I. Berman
Primary Examiner
Art Unit 2881

jb
9/27/04